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The importance of Ukrainian corn in the export potential of the animal industry of Spain

Scientific problem. Today, the European Union is one of Ukraine's largest trade partners. About a third of foreign trade turnover of Ukraine falls on trade with EU countries, and the volume of direct investments into the Ukrainian economy from EU countries is equal to 80% of the total amount of investments into Ukraine.

Ukraine is one of the key global exporters of grain crops, and for instance, in terms of corn exports, our country ranked 4th in the world, while Spain is the largest consumer of Ukrainian corn in the EU. Corn remains one of the priority crop species in feeding animals in the export-oriented animal industry of Spain, therefore it is reasonable to carry out a detailed analysis of this crop and examine the existing correlation in trade.

Analysis of recent researches and publications. Number of native scientists devoted their works to the problems of the industry's development, the formation and establishment of economic relations in the market of agricultural products, which are as follows: B.V. Duhnitsky, A.O. Melnyk, S.M. Kvasha [2], M.I. Pugachov [3] and others. At the same time, in connection with the functioning of the Deep and Comprehensive Free Trade Area between Ukraine and the European Union (DCFTA) between Ukraine and the EU, there is an urgent need to carry out analysis of the exports effectiveness of domestic goods within the existing tariff quotas in the context of modern integration processes.

The objective of the article – to explore the importance of the Ukrainian grain crops (corn) in the export potential of the animal industry of Spain.

Statement of the main results of the study. The Free Trade Area between Ukraine and the EU, stipulated by the Association Agreement, became operational on 1 January 2016. Within the next few years, the barriers to mutual trade will be gradually removed, and the Ukrainian producers will implement European standards.

The grain harvest of Ukraine in 2016 distributed as follows: 26 million metric tons of wheat, 28.1 million tons of corn, 9.4 million tons of barley and 392 thousand metric tons of rye, according to the State Statistics Service of Ukraine [5]. Volumes of wheat production give credence to almost identical indicators of successful production for two consecutive years. Thus, it is essentially to note, that corn production increased by 20 percent in comparison with the precedent periods, and barley production showed a growth of 14 percent. Still, the production of rye remained at the level of 2015.

According to the State Statistics Service of Ukraine, domestic consumption in relation to different cultures has different long-term trends. The chart below (Figure 1) shows that both wheat and rye are mainly aimed at consumption in food. Corn and barley are mainly consumed as animal feed. More than a third of corn is processed into starch and molasses by large factories in Dnipro and small processing facilities in Chernihiv and Kyiv. In addition, a small amount of corm is crushed for the production of corn oil. Small volumes of wheat targeted at the production of high quality alcohol and a small amount of barley used in brewing.

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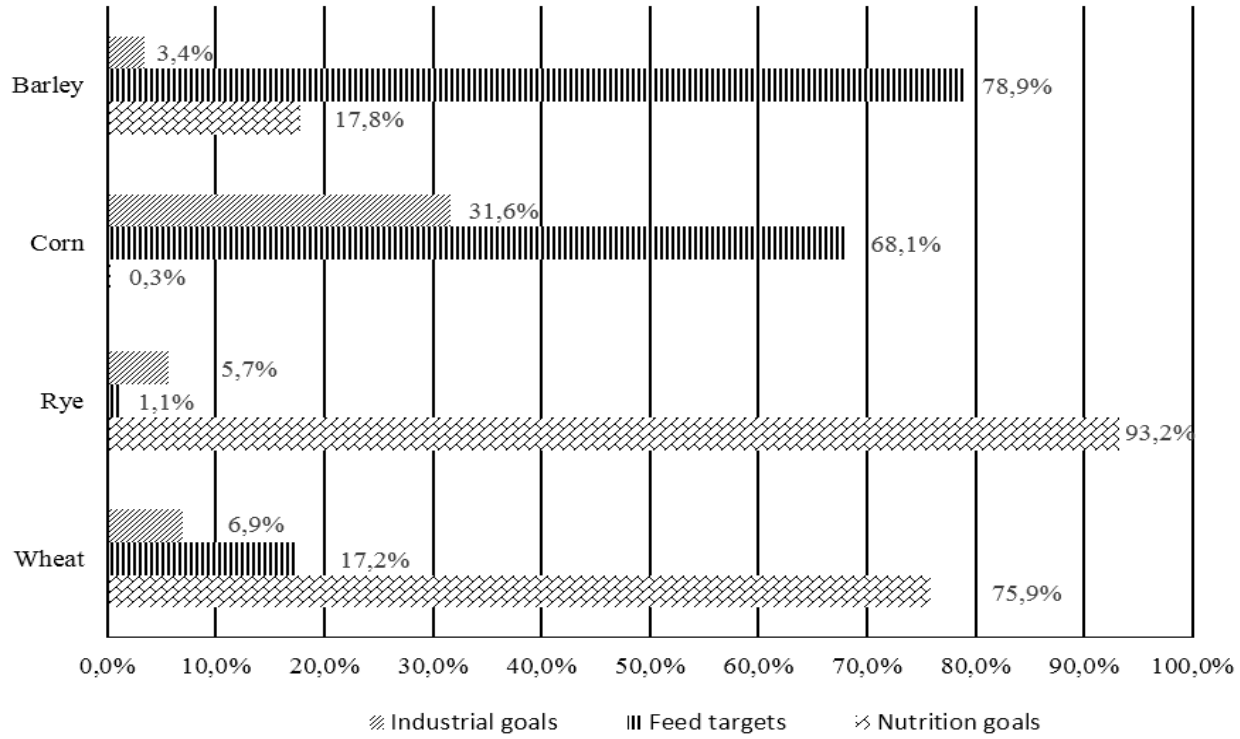

Figure 1. Distribution of domestic consumption of grain in Ukraine for 2016

*Source: developed by the author on the basis of the data of the State Statistics Service of Ukraine.

The production of wheat in the marketing year 2017/18 is projected at the level of 23.9 million tons, which is characterised by a decrease of approximately 11 percent comparing with the previous period based on the reduced winter crop area in comparison with the previous season. Exports of wheat in the new season, as expected, will reach 12.9 million tons, which is characterised by a decrease of 19 percent in comparison with the previous marketing year [4]. The production of corn in 2017/18 is projected at the level of 28.7 million tons, which is of 2 percent higher than the previous season's production, mainly due to increased sown area . According to forecasts, corn exports will come up to 21.5 million tons, which is 7 percent of the growth compared to the previous marketing year. The production of barley in the marketing year 2017/18 is projected at the level of 8.7 million tons, that is 12.5 percent lower than the production volumes in the previous year. Barley exports in the new season are projected at the level of 3.7 million tons, which is characterised by a decrease of 27.5 percent over the previous marketing year. The production of rye in 2017/18 is forecasted to reach 425 thousand tons, which is characterised by an increase of 8.5 percent comparing with the previous marketing year. This will likely lead to a balance in the domestic market, which will result in further reduction of import of this crop and will allow to establish export volume at the level of 10,000 tons [5].

Ukraine continues to develop closer economic ties with the European Union. This leads to an increase in exports for both cereals and flour mill products, which result in strong support by introducing of duty-free tariff quotas agreed by the parties under the Deep and Comprehensive Free Trade Area (DCFTA). This trend is expected to continue in the next years.

Because to the fact that Ukraine is one of the key world exporters of corn, considering that in terms of volume it takes the 4th place, it is expedient to carry out the detailed analysis of this culture.

As it was mentioned, corn production in Ukraine in 2017/18 marketing year is projected at the level of 28.7 million tons, which shows a rising trend in the amount of 2 percent comparing with the previous period of 2016/17 - 28.1 million tons. This forecast is based on the data concerning the crop area under such crop, which is 4.7 million hectares in 2017, as well as

average yields information over the past four years.

Notably, Ukrainian farmers effectively adjust their production technologies, both in accordance with weather conditions and market situations. In the fall of 2016 due to high production volumes of different crops, some producers decided to leave corn standing in fields, because of the limited storage areas. According to numerous viewpoints, the remaining corn does not lose much of its quality. As an additional advantage, farmers can harvest corn with lower humidity compared to corn harvested in the fall, which reduces the expenses on drying the crop.

Corn remains popular crop for Ukrainian farmers, as it adapts well to existing crop rotation regimes, offering high harvests compared to other crops. Essentially, farmers grow corn from hybrid seeds of domestic production, both large multinational companies and domestic farms. From farmers' perspective, at present, the varieties of corn brought out in the domestic market provide yield, similar to yields as of the international brands subject to the existence of "normal" weather conditions and their cost is much lower. Although, it is necessary to point out that there is a certain risk in such approach, given that the productivity of domestic seed material significantly reducing in the course of adverse weather conditions in comparison with imported hybrids.

Another feature that contributes into the corn production in Ukraine is the increase of expenses on seeds and agrochemicals by the farmers. This has a positive effect on quality and leads to corn yields with higher stability under the terms of adverse weather conditions.

The corn is planted in the end of April or early May when the soil warms up to 10-12° C. Weather is always a risk factor in agriculture and according to NDVI maps (Standardized vegetation index), the apparent lack of moisture in the soil is observed in several regions of the South and Central Ukraine, which can result in low corn yields.

Consumption. According to the State Statistics Service of Ukraine almost two thirds of corn, which was used for fodder purposes, was used for internal grain consumption, in 2016.

According to the State Statistics Service of Ukraine, within 2016 the number of pigs decreased by 5.5 percent, poultry by 1.1 percent and cattle by 1.8 percent. This trend continued in early 2017. For instance, the number of pigs decreased by 7.5 percent, cattle by 1.1 percent, while the number of poultry increased by 2.4 percent in January-March 2017 comparing with the same period last year. For this reason, the expert environment foresees a possible reduction, approximately up to 4.8 percent, of consumption of corn used for fodder purposes. However, it is important to note that such reduction, may be partly caused by an increase in the consumption of wheat feed.

Trade. In the marketing year 2017/18, corn exports are projected at the level of 21.5 million tons, which is 7 percent higher than in 2016/17, an estimated 20.1 million tons. The domestic corn price for most time of the 2015/16 period, as well as the beginning of the 2016/17 period, was on the mark approximately $155/t, which correlates with international prices. However, due to the large volume of corn on the market, coupled with a good harvest of other cereals, corn prices on FOB terms declined slightly at the end of the 2015/16 period, considering that logistics centres were overloaded with other cereals and oilseeds. Figure 2 displays the general geographical picture of the export of Ukrainian corn.

The diagram shows that in Europe most of the corn is exported to Spain, taking into account the European vector of development of Ukraine, it is reasonable to study the existence of dependencies.

At the beginning of the marketing year (MY) 2016/17 (October 2016 - January 2017), Ukraine shipped about 8.6 million tons of corn, which is 18 percent more than the same period of the previous marketing year. Of this number, 3.2 million tonnes were delivered to EU countries, which is reflecting a decrease of 37 percent compared with the same period of the previous marketing year. Deliveries were mainly carried out at the ports of Spain, the Netherlands and Italy. This decrease was compensated by the growth of exports to some African countries (mostly in Egypt) of about 2.5 million tonnes, which reflecting a 62 percent increase, as well as the Middle East in the amount of almost 2 million tons, which is three times more in comparison with the same period of the previous marketing year.

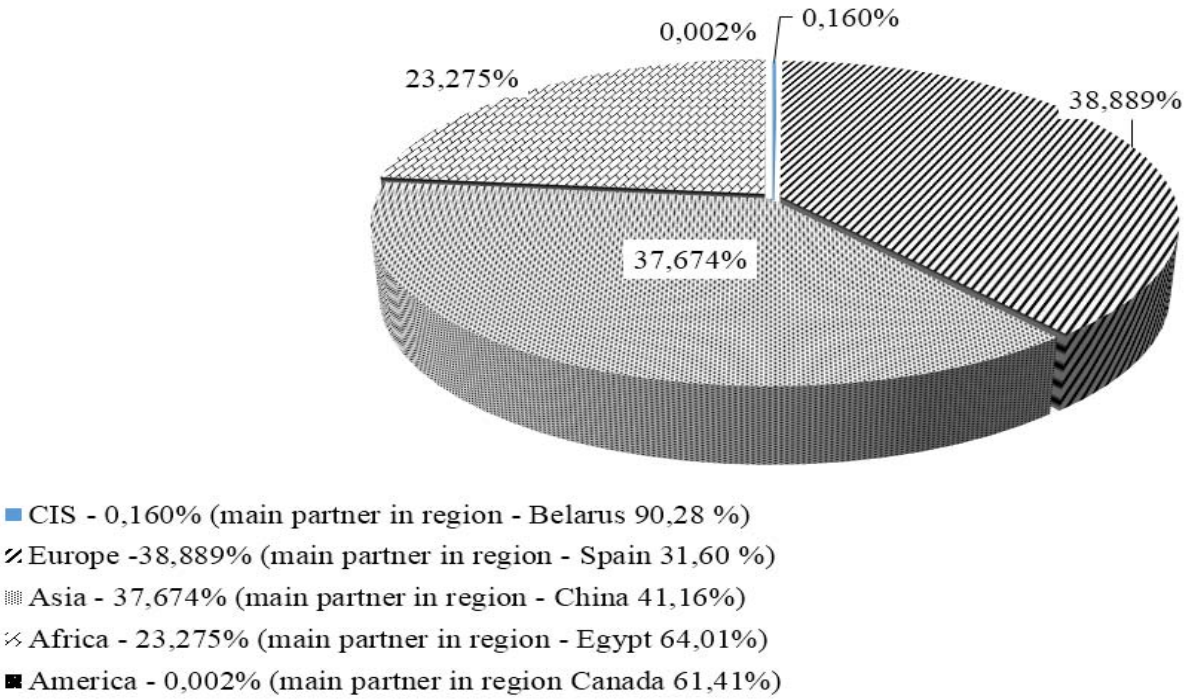

Figure 2. Export of Ukrainian corn for 2016 in terms of continents and major trading partners

*Source: developed by the author on the basis of the data of the State Statistics Service of Ukraine.

Growth of volumes of corn production in Ukraine, in turn, stimulate large seed producers to place hybrid seed production directly in Ukraine, which is reflected in the gradual decrease in imports of corn seeds. In respect to the import of high quality seed hybrid material, in most circumstances it was made from such countries as: Hungary, Romania, France and Serbia, and other countries.

Analysis of the situation concerning production, consumption, and trade of corn in Spain

Planting by corn area continues to decrease for the fifth year in a row in connection with set limits of water usage for irrigation in some river basins, and to a lesser extent, through the diversification of crops specified by the European greening requirements.

The relatively low average grain yield, associated with the high demand of the export-oriented livestock industry, stimulates the import of corn to Spain.

Bioethanol industry of Spain, in turn, consumes more than a million tons of grain per year. Corn, wheat and barley are the main cereals used to produce bioethanol.

Essentially, it should be noted that an increase in the proportion of corn in the raw material feed base of livestock industry is expected to take place. Corn remains one of the priority types of crops in animal feeding, provided that planed harvests in Spain will be reached, and the traditional cooperation in corn supply will continue with the countries such as France, Romania, Ukraine (see Figure 3).

Data on the number of import of corn to Spain shows a fair close connection with the supply of meat from Spain.

The total annual import of corn by Spain is about 6 million tons, according to the data of the UN Statistics Committee, 41% of this volume is provided by grain imports from Ukraine. Therefore, it is possible to confidently make a statement that the Ukrainian-Spanish trade and economic relations with regard to grain imports positively contribute to the economy of both countries. From the side of Ukraine –it is a stable grain buyer; from the Spanish side – it is an opportunity to grow piglets using a quality product without GMOs and, accordingly, increase the quantitative indicators for the export of meat delicacies - the Iberian ham.

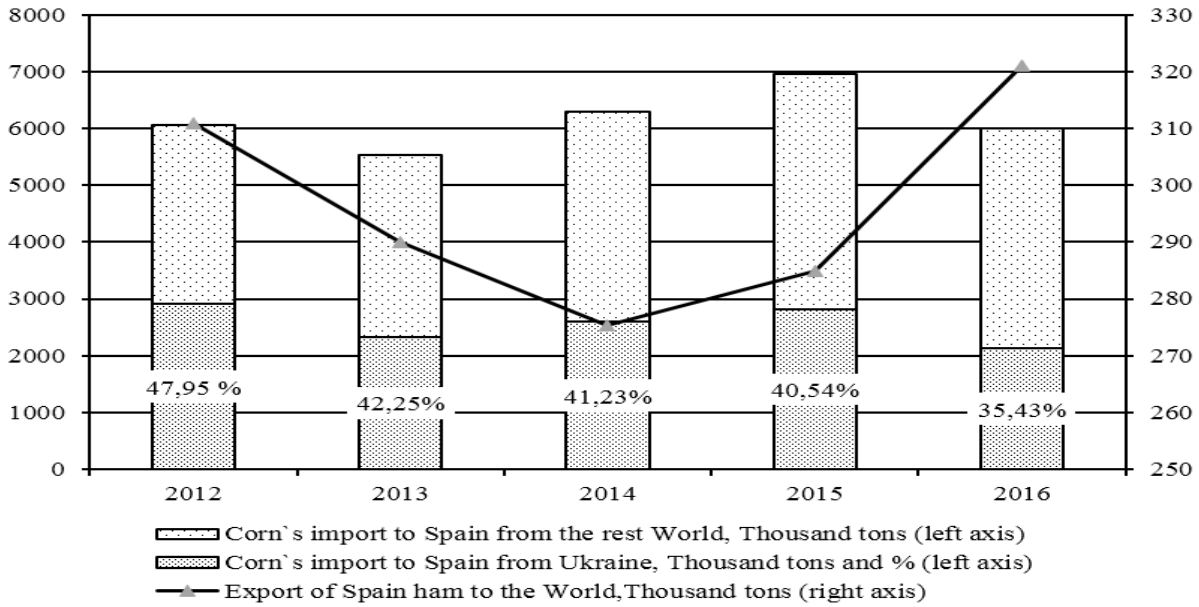

Figure 3. The share of Ukrainian corn in the total import of corn to Spain and the dynamics of export change of livestock industries (Iberian jamon) from Spain

*Source: developed by the author, data from the UNCTAD.

Written sources of the XIV century show that the meat delicacies – jamon became a part of the Spanish household culture. If previously the distant ancestors of the Spanish could only slaughter a pig and saline it, the present process of production of jamon has become a whole culture. Today, jamon is manufactured throughout Italy, except for the coast. Particularly, in the provinces of Belbas, Salamanca, Segovia, Teruel and Granada. For the preparation of ham, only a special breed of pigs is used, namely Iberian ones. The cultivation of this type of farm animal involves a strict diet. The pork diet is composed entirely of acorns, corn and vegetable feed - forage. Corn seed is a highly nutritious and valuable feed for pigs, so immediately after weaning, the pigs are fed on barley and corn for several weeks. After that, the pigs may be in free grazing on pastures and oak groves to feed herbs, acorns and roots.

Further, Spanish farmers who grow Iberian pigs also note that Ukrainian corn is preferable. After all, Ukrainian grain without GMOs, and Spanish producers include not only acorns but also high-grade Ukrainian corn products to be able to position pigs, as the ones fed solely on organic material.

In order to study the existing tendencies in foreign trade relations, it is reasonable to investigate the cohesiveness of the relationship between Ukrainian corn imports and the trends of the export-oriented livestock industry in Spain. In order to calculate the tightness of the interrelations, for the analysis were taken the complete available data for four years on the export of Ukrainian corn to Spain and the export of the meat delicacies – jamon from Spain (see Table 1).

Table 1. Calculation of the tightness of the link between the export of Ukrainian corn and the export of Spanish meat products (jamon).

Year	x Export of corn Ukraine-Spain, t	y Export of jamon Spain - World, t	X-Xcp	Y-Ycp	(X-Xcp)* (Y-Ycp)	(Xi-Xcp)2	(Y-Ycp)2
2012	2 907 876	310 884	243 288	20 600	5 011 804 082	7,07451E+11	6404291733
2013	2 333 743	290 017	-330 845	-266	87 948 823	-7,72106E+11	-77095681,05
2014	2 594 861	275 313	-69 727	-14 970	1 043 840 563	-1,80931E+11	-4121556943
2015	2 821 871	284 919	157 283	-5 364	-843 669 045	4,43833E+11	-1528309203
Aver.	2 664 588	290 283		∑	**5 299 924 423**	**198 247 013 346**	**677 329 906**

*Source: developed by the author, data from the UNCTAD.

To accomplish task at hand we calculate the Pearson correlation coefficient (Karl Pearson), which demonstrates the existence or absence of a linear dependency between two variables X and Y, which takes values from -1 to +1 inclusive. The connection is stronger when the value of the correlation is closer to 1 or -1 the value. If the value is closer to 0, then the connection is weak [1].

Positive correlation is a correlation in which the increase of one variable is associated with an increase in the other, the correlation coefficient shall be positive. If the correlation coefficient is negative, this means the presence of an opposite connection: the higher the value of one variable, the lower the value of another. That is, a negative correlation means that with the increase of one value the friend tends to decrease.

Mathematically, the correlation of two random variables is a correlation coefficient.

$$r_{xy} = \frac{\sum (Xi - \bar{X})(Yi - \bar{Y})}{\sqrt{\sum (Xi - \bar{X})^2 * \sum (Yi - \bar{Y})^2}}. \qquad (1)$$

*Source: Buxton 2008 [1]

Research result. In the course of carrying out the corresponding calculations, we have the opportunity to see that the correlation coefficient (r) has a positive value with index of 0.5 (middle correlation connection). Thus, the calculation indicates that there is a certain dependency between the quantity of imported Ukrainian corn to Spain and the volume of exports of meat products - jamon from Spain.

In respect of the correlation analysis there is possibility to deeply investigate interrelations of economic phenomena and processes, to identify the influence of factors on the results of economic activity, to identify and calculate the reserves for improving the efficiency of the national economy. All the above-mentioned actions positively affect the implementation of management, marketing and other activities, the economically sound business decision-making, both at the level of the national economy and the projection of international trade.

In addition to the above, it is understood that the connection is characterized by the fact that there is no complete correspondence between the factor and the resultant attributes, but a certain correlation exist. The peculiarity of the correlation connection is that each value of the factor characteristic corresponds not to one, but to a number of meanings of the resultant characteristic. The correlation connection can be detected only in the form of a general tendency in terms of mass comparison of factors.

Conclusions. Free access to the EU market through duty-free tariff quotas allows to encourage Ukrainian exporters to entry with agri-food products to one of the largest high-margin markets.

Ukraine is one of the main suppliers of cereals the European market, in particular, wheat, barley and corn. The average share of Ukraine in exports of wheat is 32%, in exports of barley - 45%, and in corn exports - 48%.

Notably, although there is a positive dynamic in the cultivation of grain, in the process of analysis of the question in relation to efficiency of growing on 1 hectare of land, there is still a need and expediency in introducing world cultivation technologies. With regard to the effectiveness of growing corn per 1 hectare of land, it is quite high, which indicates a great prospect of this culture in terms of export potential.

Corn belongs to the top-10 Ukrainian goods exported to the EU. The largest share of exports to the EU countries comes to Spain with a value of 31.6%, which upon the average accounts for 41% of the total imports of corn by Spain. The research showed that there is a certain squeeze dependency with the correlation coefficient amounting to 0,5, which indicates an average correlation between the export of Ukrainian corn to Spain and the Spanish export of meat delicacies - the Iberian ham.

Correct application of correlation methods makes it possible to understand the deep essence of the processes of interconnections. Correlation connections appear not in every single case, but on average in many occasions. In these connections between cause and consequence, there is no complete match, only a certain interrelation can be found.

Thus, for the Ukrainian grain market, the EU market is the most promising. However, activation and growth prospects of grain market require from Ukraine the development and implementation of certain measures and mechanisms.

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Новини АПК

Мінагрополітики України та ФАО ООН поглиблюватимуть співпрацю в рамках комплексної стратегії розвитку сільського господарства на 2015–2020 роки

Мінагрополітики та Продовольча сільськогосподарська організація ООН (ФАО) активно співпрацюють відповідно до підписаної Рамкової програми співробітництва для України з ФАО на 2016–2019 роки. Проекти, які здійснюються в рамках програми та спрямовані на реалізацію ключових пріоритетів Єдиної комплексної стратегії розвитку сільського господарства і сільських територій України на 2015–2020 роки, вже мають успішні результати.

Про це повідомила заступник Міністра аграрної політики та продовольства України з питань євроінтеграції Ольга Трофімцева під час зустрічі із заступником Регіонального представника Продовольчої та сільськогосподарської організації ООН (ФАО) для Європи та Центральної Азії паном Раймондом Єлем.

«Ми дуже вдячні нашим колегам з ФАО за успішну співпрацю та реалізацію проектів технічної допомоги. Надзвичайно важливою є програма підтримки фермерів на сході України та комплексне дослідження ролі сільського господарства у постраждалих від конфлікту Луганській та Донецькій областях. Саме такі конкретні й ефективні проекти є для нас чудовим прикладом роботи над практичними моделями для забезпечення стійких продовольчих систем і ефективніших ланцюгів доданої вартості на регіональному рівні», - відмітила заступник Міністра з питань євроінтеграції.

Ольга Трофімцева розповіла, що підтримка ФАО охоплює такі надзвичайно важливі сфери, як земельна реформа, лісове господарство, розвиток сільського підприємництва в Луганській та Донецькій областях, адаптація аграрного сектору до змін клімату та інші.

«Міністерство аграрної політики та продовольства України зацікавлено в подальшій активній співпраці з ФАО за даними напрямами і в активнішому залученню експертів організації у процеси підтримки реформ, якими займається Мінагрополітики», – зазначила заступник Міністра.

Ольга Трофімцева додала, що на сьогодні пріоритетними завданнями для співпраці України та ФАО є такі напрями: розвиток бізнес–клімату та встановлення стабільної правової основи функціонування агробізнесу, земельна реформа і продовольча безпека, формування стійких ланцюгів доданої вартості для аграрного та харчового секторів, а також відкриття нових висомаржинальних ринків для експорту української аграрної та харчової продукції. З огляду на важливість якісної статистичної та аналітичної бази для даних цілей заступник Міністра та пан Єлем обговорили можливість підтримки ФАО щодо приєднання України до інформаційної платформи SNAP (safety net alert platform – платформа сповіщення про продовольчу безпеку).

Під час зустрічі сторони також відзначили важливість подальших скоординованих спільних дій з метою активнішого розвитку сімейних фермерських господарств, відновлення системи дорадництва в Донецькій та Луганській областях, підтримки підприємництва у сільській місцевості для ветеранів антитерористичної операції та формування комплексного підходу до розвитку сільських територій.

Прес-служба Мінагрополітики України